

High-Gain, Low-Excess-Noise APD Arrays for Near-Single-Photon-Sensitive LADAR, Phase I

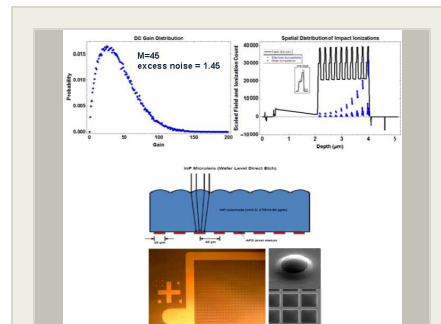
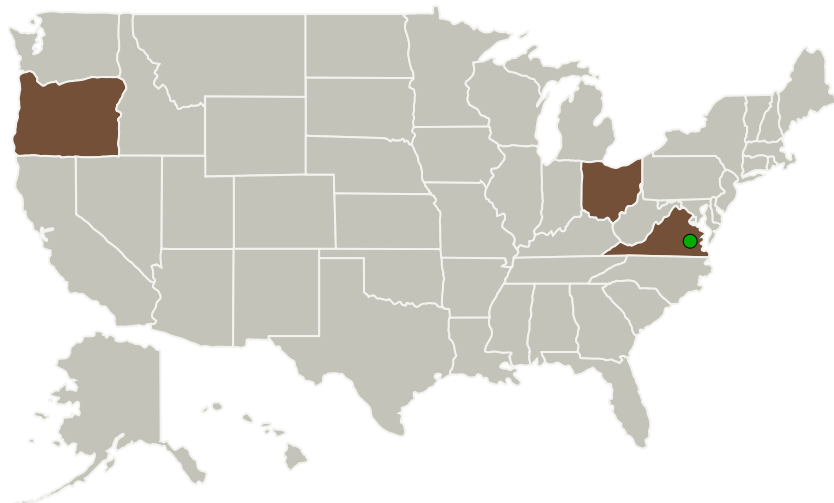
Completed Technology Project (2016 - 2017)



Project Introduction

One of the challenges facing missions to other planetary bodies including Earth's Moon, Mars, Venus, Titan, Europa; and proximity operations (including sampling and landing) on small bodies such as asteroids and comets' is the ability to provide accurate altimetry for descent, then assess safe landing sites by surveying the landscape. To address NASA's need for space-hardened planetary entry, descent, and landing (EDL) and proximity-operations sensors, a low-cost, high-pixel-density avalanche photodiode detector array technology will be developed that is sensitive in the 0.9- μm to 1.7- μm spectral range and when operated at room temperature, can achieve nearly noiseless avalanche gain, allowing for near-single-photon sensitivity. In Phase I, a series of detector structures will be grown, fabricated, and tested. The performance of the detectors will be used to predict performance of the arrays when coupled to low-noise readout integrated circuits. Single element devices coupled to low-noise amplifiers will be used to validate the predictive models.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Voxtel, Inc.	Lead Organization	Industry	Beaverton, Oregon
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
University of Dayton	Supporting Organization	Academia	Dayton, Ohio

Primary U.S. Work Locations	
Ohio	Oregon
Virginia	

Project Transitions

▶ **June 2016:** Project Start

✓ **June 2017:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139752>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Voxtel, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

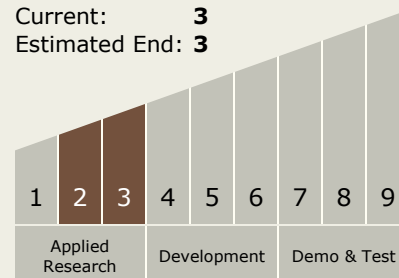
Carlos Torrez

Principal Investigator:

Andrew Huntington

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3

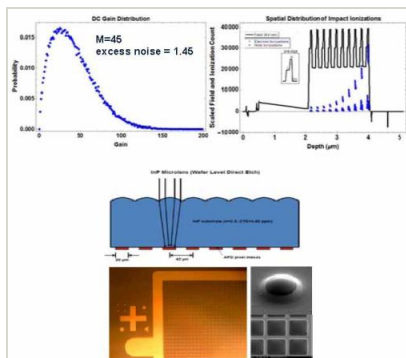


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Images



Briefing Chart Image

High-gain, Low-excess-noise APD Arrays for Near-single-photon-sensitive LADAR, Phase I
(<https://techport.nasa.gov/image/127950>)



Final Summary Chart Image

High-gain, Low-excess-noise APD Arrays for Near-single-photon-sensitive LADAR, Phase I Project Image
(<https://techport.nasa.gov/image/128713>)

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
 - └ TX09.4 Vehicle Systems
 - └ TX09.4.4 Atmosphere and Surface Characterization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System